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Does the Direction of Ductal Blood Flow Affect Regional Circulatory Hemodynamics in Duct Dependent Congenital Heart Disease?

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BACKGROUND: In newborn infants with duct dependent congenital heart disease (CHD) published data suggest that the direction of ductal shunting determines regional vascular blood flow. We therefore hypothesized that regional blood flow velocities (BFV) in infants with CHD would differ significantly between those with right to left and left to right duct dependent circulations.

OBJECTIVE: To demonstrate a difference in cerebral and splanchnic circulatory hemodynamics between infants with hypoplastic left heart syndrome (HLHS) a right to left duct dependent lesion and infants with pulmonary atresia (PA) a left to right duct dependent lesion.

DESIGN/METHODS: Doppler blood flow velocity measurements from the anterior cerebral (ACA), celiac (CA) and superior mesenteric (SMA) arteries were performed on stable newborn infants with HLHS and PA. Average velocity (AV) and pulsatility index (PI) were calculated from the Doppler waveform for each blood vessel and the predominant direction of ductal blood flow was noted.

RESULTS: Data were obtained from infants with HLHS (n=10) and PA (n=9) at age 2-3 days. No significant differences in birth weight, gestational age, acid-base status or ventilatory parameters were demonstrated between the groups. All infants had a patent ductus (PDA) at the time of study. Ductal blood flow was from right to left in infants with HLHS and from left to right in infants with PA. There was a suggestion toward increased AV in all vessels in PA, this did not achieve statistical significance. Data are presented as Median value (Interquartile range)

Regional Blood Flow Velocities		
	PA (n=9)	**HLHS** (n=10)
ACA-AV (cm/sec)	21.5 (19.5, 27.0)	17.5 (14.0,20.0)
CA-AV (cm/sec)	37.0 (34.7, 45.2)	27.0 (22.0, 38.0)
SMA-AV (cm/sec)	24.0 (17.7, 39.0)	21.0 (13.0, 22.5)

No significant differences were detected in PI between the two groups.

CONCLUSIONS: We have failed to demonstrate any significant differences in regional BFV between infants with right to left (HLHS) and left to right (PA) duct dependent circulations. These data suggest that regional perfusion in newborn infants with duct dependent congenital heart lesions is determined by factors in addition to the direction of PDA blood flow. Further focused studies are required to help elucidate mechanisms which control regional blood flow in these newborn infants.